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ब्रेल अनुलिपिकरण शीट — विशिष्टि

Indian Standard

BRAILLE DUPLICATING SHEET — SPECIFICATION

UDC 655·38·022·72 : 681·621·1

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

July 1993

Price Group 2

Artificial Limbs, Rehabilitation Appliances and Equipment for the Disabled Sectional Committee, MHD 10

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Artificial Limbs, Rehabilitation Appliances and Equipment for the Disabled Sectional Committee had been approved by the Medical Equipment and Hospital Planning Division Council.

Braille duplicating sheet is used for the duplication of masters of braille script by making use of braille duplicating machine.

In the preparation of this standard, assistance has been derived from the publication IITD RDS 01 'Braille duplicating sheet — Specification', issued by the Indian Institute of Technology, Delhi.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

BRAILLE DUPLICATING SHEET — SPECIFICATION

1 SCOPE

1.1 This standard specifies the requirements for braille duplicating sheet used for the duplication of masters of braille script for visually impaired persons.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
2076 : 1981	Unsupported flexible polyvinyl chloride sheeting (*first revision*)
3346 : 1980	Method of determination of thermal conductivity of thermal insulation materials (two slab guarded hot plate method) (*first revision*)
6307 : 1985	Rigid PVC sheets (*first revision*)
10151 : 1982	Polyvinyl chloride (PVC) and its copolymers for its safe use in contact with foodstuffs, pharmaceuticals and drinking water
11647 : 1986	Braille paper

3 TERMINOLOGY

3.1 Braille Duplicating Sheet

The sheet suitable for the duplication of masters of braille script (text, graphs, maps, diagrams, etc, with different contours) with the help of braille duplication machine using vacuum thermoforming technique.

3.2 Dot Height Ratio

Dot height ratio is the ratio of the dot height on the duplicated sheet (*see* **8.5**) to the dot height on the master copy.

4 MATERIAL

4.1 The braille duplicating sheet shall be made of polyvinyl chloride suitably compounded with other ingredients and shall conform to IS 10151 : 1982.

4.2 The braille duplicating sheet may be of any colour and may be transparent/opaque.

5 DIMENSIONS

5.1 The sheet shall be of size (281 mm ± 2 mm) × (294 mm ± 2 mm), or any other size as agreed to between the purchaser and the supplier.

5.2 The apparent thickness of the sheet shall be uniform when measured at any point and shall not be less than 0·125 mm. The tolerances on thickness shall be in accordance with IS 6307 : 1985.

6 REQUIREMENTS

6.1 Mass

The mass of each sheet shall be 12·5 g ± 1·0 g.

6.2 Rigidity

The sheet shall be semi-rigid.

6.3 Specific Gravity

The specific gravity of the braille duplicating sheet shall be 1·4 ± 0·2 when determined in accordance with **A-1.1** and **A-1.1.1** of IS 2076 : 1981.

6.4 Thermal Conductivity

The thermal conductivity of the sheet shall be (3·75 ± 0·25) × 10^{-4} cal/sec/cm/°C when determined in accordance with IS 3346 : 1980.

6.5 Softening Point

The softening point (Vicat) shall be 58°C when determined in accordance with Appendix B of IS 6307 : 1985.

6.6 Re-usability

The sheet shall be capable of being re-used for a minimum of 4 times.

7 MANUFACTURE, WORKMANSHIP AND FINISH

7.1 The braille duplicating sheet shall be produced by a suitable calendering process. During manufacture, 0·5 percent anti-static agent shall be added to reduce the static charges and 0·5 percent fungicide shall be added to ensure that no fungal growth takes place during use or on storage.

7.2 The sheet shall be uniform, coloured, transparent/opaque with suede surface texture and shall be completely free from detrimental scratches, creases, streaks, pinholes, dents, pimples, etc.

8 TESTS

8.1 Tensile Strength and Elongation Test

The braille duplicating sheet shall have the following characteristics:

Direction	*Tensile Strength* kg/cm^2	*Elongation* %
Longitudinal	400, *Min*	50, *Min*
Transverse	300, *Min*	15, *Min*

The tensile strength and elongation in longitudinal and transverse directions shall be measured using tensile testing machine. The test conditions and sample size shall be in accordance with Appendix B of IS 2076 : 1981.

8.2 Dimensional Stability Test

The dimensional stability shall be tested in accordance with **4.8** of IS 2076 : 1981.

8.3 Effect of Water

8.3.1 There shall be no effect on the sheet when water at 5°C is impinged on it.

8.3.2 The sheet shall show some softening when water at 100°C is impinged on it.

8.4 Water Absorption Test

The water absorption by the sheet shall be 1·5 percent, maximum and there shall be no warping, cracking or change in appearance when tested by the method specified in Annex A of this standard.

8.5 Test for Dot Height Ratio

The dot height ratio shall be 0·80, minimum when determined as follows:

Cut two 125 mm × 125 mm pieces from a duplicated sheet, one from the margin where there are no dots and another where one letter is represented by at least 5 embossed dots. Measure the thickness, using a dial thickness gauge, of both the pieces. The difference between two thicknesses shall be the dot height on duplication sheet (A). Similarly, determine the dot height on master copy by cutting two pieces and measuring the thickness with and without the dots. The difference between two measurements shall be the dot height on the master copy (B). The dot height ratio (DHR) is given by:

$$\text{DHR} = \frac{A}{B}$$

8.6 Dot Durability Test

The durability of dots is assessed by finding the reduction in the dot height ratio (measured by the method given in **8.5**) of the duplicated sheet when a specified load is applied on the dots using a roller of the design shown in Fig. 1. Fix a duplicated sheet on a wooden board such that the margin faces upwards. Keep the roller on the margin and move it smoothly and steadily over the embossed dots in both downward and upward direction for 50 times. At the end of the test, the reduction in dot height ratio shall not be more than 50 percent of the original.

9 INSTRUCTIONS FOR USE

9.1 Instructions for use shall be provided with each packing of braille duplicating sheet. The procedure of binding shall be clearly mentioned in the instructions (*see also* **10.1**).

10 BINDING

10.1 Normal PVC sheet binding shall be applicable.

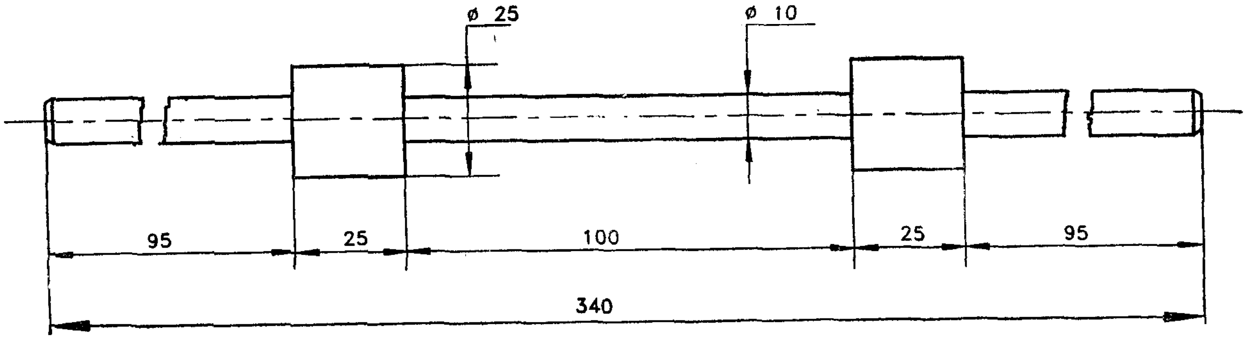
11 MARKING

11.1 The braille duplicating sheet shall be marked with the indication of the source of manufacture and its size.

11.2 The markings on the reverse of braille sheet shall be done by print transfer, engraving raised letters at a suitable location.

12 PACKING

12.1 The packing shall be as agreed to between the manufacturer and the purchaser and it shall ensure that the sheets are not folded.



All dimensions in millimetres.

Fig. 1 Roller

ANNEX A

(*Clause* 8.4)

WATER ABSORPTION TEST

A-1 APPARATUS

A-1.1 Analytical Balance, capable of reading up to 0·000 1 g.

A-1.2 Oven, capable of maintaining uniform temperatures of 50 ± 3°C and of 105 to 110°C.

A-2 TEST SPECIMENS

A-2.1 Each test specimen shall be in the form of a rectangular strip 76·2 mm × 25·4 mm × thickness of the sheet.

A-2.2 The test specimens shall be machined, sawed, or sheared from the sample so as to have smooth edges free from cracks. The cut edges shall be made smooth by finishing with No. 0 or finer sandpaper or emery cloth. Sawing, machining and finishing operations shall be slow enough so that the material is not heated appreciably.

NOTE — If there is any oil on the surface of the specimen before or as a result of machining operations, wash the specimen with a cloth wet with gasoline to remove oil, wipe with a dry cloth and allow to stand in air for 2 hours to permit evaporation of the gasoline. If the gasoline attacks the plastic, use some suitable solvent or detergent that will evaporate within 2-hour period.

A-2.3 The thickness of the sheet for various specimens shall be measured to the nearest 0·025 mm and the other dimensions shall be measured within 0·8 mm.

A-3 CONDITIONING

A-3.1 Three test specimens shall be conditioned by drying in an oven for 1 hour at 105 to 110°C, and immediately weighed to the nearest 0·001 g (m_1).

NOTE — If a static charge interferes with the weighing, lightly rub the surface of the specimens with a grounded conductor.

A-4 PROCEDURE

A-4.1 Conditioned specimens shall be placed in a container of distilled water maintained at 50 ± 1°C, and shall be supported on edge and shall be entirely immersed. At the end of 48 ± 1 hour, the specimens shall be removed from the water, one at a time, all surface water removed with a dry cloth, and the specimens weighed to the nearest 0·001 g immediately (m_2).

A-5 RECONDITIONING

A-5.1 When material is known or suspected to contain any appreciable amount of water-soluble ingredients, the specimens, after immersion, shall be weighed, and then reconditioned for the same time and temperature as used in the original drying period. They shall then be cooled in a desiccator and immediately reweighed (m_3). If the reconditioned weight is lower than the conditioned weight, the difference shall be considered as water-soluble matter lost during the immersion test. For such materials, the water-absorption value shall be taken as the sum of the increase in weight on immersion and of the weight of the water-soluble matter.

A-6 CALCULATION AND REPORT

A-6.1 The report shall include the values for each specimen and the average for three specimens as follows:

a) Dimensions of the specimens before test, measured in accordance with **A-2.3** and reported to the nearest 0·025 mm;

b) Conditioning time and temperature;

c) Percentage increase in weight during immersion, calculated to the nearest 0·01 percent as follows:

Increase in weight (%) =

$$\frac{m_2 - m_1}{m} \times 100$$

d) Percentage of soluble matter lost during immersion, if determined, calculated to the nearest 0·01 percent as follows (*see* Note below):

Soluble matter lost (%) =

$$\frac{m_2 - m_3}{m_2} \times 100$$

NOTE — When the water on reconditioning the specimen after immersion in water exceeds the conditioned weight prior to immersion, report none under **A-6.1** (**d**).

e) Percentage of water absorbed which is the sum of the values in **A-6.1 (c)** and (d); and

f) Any observation as to warping, cracking or change in appearance of the specimens.

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